VOLUME 109 1990

PROCEEDINGS OF THE

AMERICAN MATHEMATICAL SOCIETY

EDITED BY

William Adams
J. Marshall Ash
Maurice Auslander
Andreas R. Blass
Andrew M. Bruckner
Dennis Burke
Frederick R. Cohen
William J. Davis, Managing Editor
Clifford J. Earle, Jr.
Lawrence F. Gray
Palle E. T. Jorgensen
Jeffry N. Kahn
Barbara L. Keyfitz
Kenneth R. Meyer
Paul S. Muhly
George C. Papanicolaou
Louis J. Ratliff, Jr.
Jonathan M. Rosenberg
James E. West
Warren J. Wong

PROVIDENCE, RHODE ISLAND USA

ISSN 0002-9939

Copying and reprinting. Individual readers of this publication, and nonprofit libraries acting for them, are permitted to make fair use of the material, such as to copy a chapter for use in teaching or research. Permission is granted to quote brief passages from this publication in reviews, provided the customary acknowledgement of the source is given.

Republication, systematic copying, or multiple reproduction of any material in this publication (including abstracts) is permitted only under license from the American Mathematical Society. Requests for such permission should be addressed to the Executive Director, American Mathematical Society, P.O. Box 6248, Providence, Rhode Island 02940-6248.

The owner consents to copying beyond that permitted by Sections 107 or 108 of the U.S. Copyright Law, provided that a fee of $1.00 plus $.25 per page for each copy be paid directly to the Copyright Clearance Center, Inc., 27 Congress Street, Salem, Massachusetts 01970. When paying this fee please use the code 0002-9939/90 to refer to this publication. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotion purposes, for creating new collective works, or for resale.

Copyright ©1990 by the American Mathematical Society. All rights reserved.
Printed in the United States of America
The American Mathematical Society retains all rights
except those granted to the United States Government.
The paper used in this book is acid-free and falls within the guidelines
established to ensure permanence and durability.

PROCEEDINGS OF THE AMERICAN MATHEMATICAL SOCIETY

CONTENTS

Vol. 109, No. 1 **May 1990** **Whole No. 371**

A. ALGEBRA AND NUMBER THEORY

Matrix generation of Pythagorean n-tuples. By DANIEL CASS and PASQUALE J. ARPAIA . 1
Filtrations of rational representations of reductive groups of semisimple rank 1. By STEPHEN DOTY 9
On the number of self-dual bases of $GF(q^m)$ over $GF(q)$. By DIETER JUNGNICKEL, ALFRED J. MENEZES, and SCOTT A. VANSTONE 23
On the smoothed Toeplitz extensions and K-theory. By RONGHUI JI 31
PI semigroup algebras of linear semigroups. By JAN OKNIŃSKI and MOHAN S. PUTCHA . 39
Commuting and centralizing mappings in prime rings. By J. VUKMAN 47
Rationality of some genus 0 extensions of $K(X)$. By JAMES K. DEVENEY and JOE YANIK 53
Notes on the Baumslag–Solitar nonresidually finite examples. By ROBERT I. CAMPBELL . 59
Betti numbers for modules of finite length. By HARA CHARALAMBOUS, E. GRAHAM EVANS, and MATTHEW MILLER 63

B. ANALYSIS

C_1 is uniformly Kadec-Klee. By CHRIS LENNARD 71
A linearization of the circular maximal operator. By DANIEL M. OBERLIN 79
Hardy inequalities. By ANDREAS WANNEBO 85
Stable unit balls in Orlicz spaces. By ANTONIO SUÁREZ GRANERO 97
The existence of absolutely continuous invariant measures for $C^{1+\varepsilon}$ Jablonski transformation in R^n. By YOU-SHI LOU 105
Properties on the unit circle of polynomials with unimodular coefficients. By DONALD J. NEWMAN and ANDRÉ GIROUX 113
On the characterization of $H^p(R^n)$ in terms of Fourier multipliers. By AKIHITO UCHIYAMA 117
Copies of l_∞ in $L^p(\mu; X)$. By JOSÉ MENDOZA 125
Convolution in the harmonic Hardy class h^p with $0 < p < 1$. By MIROSLAV PAVLOVIĆ . . 129
Norms of positive operators on L^p-spaces. By RALPH HOWARD and ANTON R. SCHEP . . 135
Principal eigenvalues for problems with indefinite weight function on R^N. By K. J. BROWN, C. COSNER, and J. FLECKINGER 147
On the equation $\operatorname{div}(|\nabla u|^{p-2}\nabla u) + \lambda|u|^{p-2}u = 0$. By PETER LINDQVIST 157
On the theorem of Frullani. By JUAN ARIAS-DE-REYNA 165
On eigenvalue problems of the p-Laplacian with Neumann boundary conditions. By YIN XI HUANG 177
A note on exponential integrability and pointwise estimates of Littlewood–Paley functions. By MARK LECKBAND 185
Locally efficient monotone operators. By ANDREI VERONA and MARIA ELENA VERONA . 195

D. GEOMETRY

On closed twisted curves. By SUELI I. RODRIGUES COSTA 205
On the sectional curvature of compact hypersurfaces. By LESLIE COGHLAN and YOE ITOKAWA 215

G. TOPOLOGY

Maps between orbifolds. By MASAYUKI YAMASAKI 223
Restrictions of open mappings of continua. By WITOLD D. BULA and E. D. TYMCHATYN 233
First countability and local simple connectivity of one point unions. By KATSUYA EDA . 237
Rotation sets of toral flows. By JOHN FRANKS and MICHAŁ MISIUREWICZ 243
Decreasing chains without lower bounds in the Rudin-Frolík order. By EVA BUTKOVIČOVÁ 251
Three cardinal functions similar to net weight. By ROY A. JOHNSON, ELIZA WAJCH, and WŁADYSŁAW WILCZYŃSKI 261

On Rhoades' open questions. By SHIH-CEN CHANG and QI-CHUN ZHONG 269
Large compact separable spaces may all contain βN. By ALAN DOW 275

H. COMBINATORICS

A partition theorem for [0, 1]. By H. J. PRÖMEL and B. VOIGT 281

Vol. 109, No. 2 **June 1990** **Whole No. 372**

A. ALGEBRA AND NUMBER THEORY

When is a flat algebra of finite type?. By PETER SCHENZEL 287
Settling a number of questions about hyper-Archimedean lattice-ordered groups.
By PAUL CONRAD and JORGE MARTINEZ 291
A note on some elementary measures of algebraic independence. By ROBERT TUBBS ... 297
Commutators and Π-subgroups. By ROLF BRANDL 305
Strong preinjective partitions and representation type of Artinian rings.
By BIRGE ZIMMERMANN-HUISGEN 309
Cancellation counterexamples in Krull dimension 1. By ROBERT M. GURALNICK,
LAWRENCE S. LEVY, and ROBERT B. WARFIELD, JR. 323
A brief proof of Jacobian hypothesis implies flatness. By MASAYOSHI MIYANISHI,
LORENZO ROBBIANO, and STUART SUI-SHENG WANG 327

B. ANALYSIS

A nonlinear Perron–Frobenius theorem. By ROBERT SINE 331
Relations between Banach function algebras and their uniform closures.
By TAHER G. HONARY 337
A remark on strong maximum principle for parabolic and elliptic systems.
By XUEFENG WANG 343
A characterization of certain measures using quasiconformal mappings.
By CRAIG A. NOLDER 349
Inverse-closed Carleman algebras of infinitely differentiable functions. By JAMIL A. SIDDIQI 357
Invariant subspaces of finite codimension for measures with thin support. By T. T. TRENT 369
On ordered A-bounded variation. By FRANCISZEK PRUS-WIŚNIOWSKI 375
Instantaneous shrinking in nonlinear diffusion-convection. By B. H. GILDING and
R. KERSNER 385
An asymptotic bound for the iterates of certain real functions near a contractive fixed point.
By LAWRENCE J. WALLEN 395
Inductive limits of normed algebras and m-convex structures. By M. OUDADESS 399
Boundedness of the Calderón–Zygmund singular integral operators on Ba spaces.
By WEN-DONG CHANG 403
Reflexivity of pairs of shifts. By MAREK PTAK 409
On double cosine, sine, and Walsh series with monotone coefficients. By FERENC MÓRICZ 417
Mosco convergence and reflexivity. By GERALD BEER and JONATHAN M. BORWEIN 427
Leading terms in the heat invariants. By THOMAS P. BRANSON, PETER B. GILKEY, and
BENT ØRSTED 437
Lifting homeomorphisms of a complex surface to its normalization.
By WILLIAM A. ADKINS 451
Łojasiewicz's support and doubly stochastic measures. By P. MIKUSIŃSKI, H. SHERWOOD,
and M. D. TAYLOR 455

C. APPLIED MATHEMATICS

A Thomson's principle for infinite, nonlinear resistive networks. By L. DE MICHELE and
P. M. SOARDI 461

D. GEOMETRY

Construction of harmonic maps between pseudo-Riemannian spheres and hyperbolic spaces. By J. J. KONDERAK 469

Isoperimetric inequalities for convex cones. By PIERRE-LOUIS LIONS and FILOMENA PACELLA 477

E. LOGIC AND FOUNDATIONS

An unboundedness property for norms of length $\geq \omega_2$. By STEVE JACKSON 487

On the Mal'cev correspondence. By CARLOS R. VIDELA 493

F. STATISTICS AND PROBABILITY

A large deviation principle for the reduction of product representations. By N. G. DUFFIELD 503

The distribution of Rademacher sums. By S. J. MONTGOMERY-SMITH 517

G. TOPOLOGY

Density of the lexicographically ordered space $\{0, 1\}^a$. By W. W. COMFORT 523

Higher-dimensional shift equivalence and strong shift equivalence are the same over the integers. By J. B. WAGONER 527

Michael selection theorem under weak lower semicontinuity assumption. By KRZYSZTOF PRZESŁAWSKI and LONGIN E. RYBIŃSKI 537

A characterization of continua that contain no n-ods and no W-sets. By ELDON J. VOUGHT 545

Divisibility of generalized exponential and logarithmic coefficients. By DONALD M. DAVIS 553

Pseudo-orbits and topological entropy. By MARCY BARGE and RICHARD SWANSON 559

Uniformity and uniformly continuous functions for locally compact groups. By PAUL MILNES 567

SHORTER NOTES

Explicit transitive automorphisms of the closed unit square. By XIAO-QUAN XU 571

Vol. 109, No. 3 **July 1990** **Whole No. 373**

A. ALGEBRA AND NUMBER THEORY

The diophantine equation $f(x) = g(y)$. By TODD COCHRANE 573

Two families of stable bundles with the same spectrum. By A. P. RAO 579

Growth functions for residually torsion-free nilpotent groups. By ROGER C. ALPERIN and BRIAN L. PETERSON 585

On theta pairs for a maximal subgroup. By N. P. MUKHERJEE and PRABIR BHATTACHARYA 589

Evaluation of the infinite series $\sum^{\mathbf{C}}_{\left(\frac{n}{p}\right)=1} \left(\frac{n}{p}\right)_4 n^{-1}$. By KENNETH HARDY and KENNETH S. WILLIAMS 597

Priestley spaces. By P. VENUGOPALAN 605

The relative form of Gersten's conjecture for power series over a complete discrete valuation ring. By L. REID and C. SHERMAN 611

Unique subwords in nonperiodic words. By C. M. WEINBAUM 615

Modular extensions. By SHIZUKA SATO 621

Nodal quintic threefolds and nodal octic surfaces. By CIPRIAN BORCEA 627

t-linked overrings as intersections of localizations. By DAVID E. DOBBS, EVAN G. HOUSTON, THOMAS G. LUCAS, and AND MUHAMMAD ZAFRULLAH 637

Hall subgroup normalizers and character correspondences in M-groups. By I. M. ISAACS 647

B. ANALYSIS

Periodic solutions for nonlinear evolution equations in a Banach space. By IOAN I. VRABIE 653
The converse of the Minkowski's inequality theorem and its generalization.
By JANUSZ MATKOWSKI 663
Weak convergence and weak compactness for multifunctions with values in a separable Banach space. By NIKOLAOS S. PAPAGEORGIOU 677
The Haagerup type cross norm on C^*-algebras. By TAKASHI ITOH 689
The operator inequality $P \leq A^*PA$. By B. P. DUGGAL 697
Topological rationalization of a class of meromorphic functions. By A. MEZIANI 699
Commutativity in operator algebras. By DAVID P. BLECHER 709
A property of purely infinite simple C^*-algebras. By SHUANG ZHANG 717
Hilbert-Schmidt Hankel operators on the Bergman space. By KEHE ZHU 721
An extreme absolutely continuous RP-measure. By JOHN N. MCDONALD 731
Descriptions of nest algebras. By M. ANOUSSIS and E. G. KATSOULIS 739
When does $ca(\Sigma, X)$ contain a copy of l_∞ or c_0? By LECH DREWNOWSKI 747
Spectral pictures of hyponormal bilateral operator weighted shifts.
By DOMINGO A. HERRERO 753
Geometric finiteness of certain Kleinian groups. By G. P. SCOTT and G. A. SWARUP ... 765
Nonoscillatory solutions of second order differential equations with integrable coefficients.
By MANABU NAITO 769
Hypercompletions of Riesz spaces. By WOLFGANG FILTER 775
Stable rank of subalgebras of the ball algebras. By RUDOLF RUPP 781

D. GEOMETRY

Lower bounds for the extrinsic total curvatures of a space-like codimension 2 surface in Minkowski space. By MAREK KOSSOWSKI 787
Minimal shell of a typical convex body. By ANDREANA ZUCCO 797
Multiplier groups of planar difference sets and a theorem of Kantor. By CHAT YIN HO and ALEXANDER POTT 803

E. LOGIC AND FOUNDATIONS

Lifting theorems in nonstandard measure theory. By DAVID ROSS 809

G. TOPOLOGY

A stable/unstable "manifold" theorem for area preserving homeomorphisms of two manifolds. By STEWART BALDWIN and EDWARD E. SLAMINKA 823
Subdominant ultrametrics. By JOSÉ M. BAYOD and J. MARTÍNEZ-MAURICA 829
A construction of a Dowker space. By STEPHEN WATSON 835
Eigenvalue comparison for tubular domains. By JEFFREY M. LEE 843
Centralizers of immersions of the circle. By CARLOS ARTEAGA 849
A note on Weinstein's conjecture. By AUGUSTIN BANYAGA 855

Vol. 109, No. 4 **August 1990** **Whole No. 374**

A. ALGEBRA AND NUMBER THEORY

Growth of two-step solvable Lie algebras. By SHIGERU KOBAYASHI and MANABU SANAMI 859
The syntactic monoid of an infix code. By MARIO PETRICH and GABRIEL THIERRIN 865
On the number of subgroups of given order in a finite p-group of exponent p.
By YA. G. BERKOVICH 875
Embedding differential and skew polynomial rings into Artinian rings.
By WILLIAM D. BLAIR and LANCE W. SMALL 881
A property of polynomial curves over a field of positive characteristic. By D. DAIGLE .. 887
Sums of semiprime, z, and d l-ideals in a class of f-rings. By SUZANNE LARSON 895

Algebras with large homological dimensions. By ELLEN KIRKMAN and JAMES KUZMANOVICH 903
Weakly factorial domains and groups of divisibility. By D. D. ANDERSON and MUHAMMAD ZAFRULLAH 907
A characterization of sums of $2n$th powers of global meromorphic functions. By JESÚS M. RUIZ 915
An analogue to Glauberman's ZJ-theorem. By BERND STELLMACHER 925
On I^2-plurigenera of not-log-canonical Gorenstein isolated singularities. By MASATAKA TOMARI and KIMIO WATANABE 931
Finite projectivity and contravariant finiteness. By K. IGUSA, S. O. SMALØ, and G. TODOROV 937
Grothendieck groups for hypersurface rings. By ØYVIND SOLBERG 943
The Lie algebra associated to the lower central series of a link group and Murasugi's conjecture. By JOHN P. LABUTE 951

B. ANALYSIS

The Orlicz-Pettis theorem fails for Lumer's Hardy spaces $(LH)^p(B)$. By M. NAWROCKI . 957
Inequalities involving multivariate convex functions II. By EDWARD NEUMAN 965
On (0, 1, 2) interpolation in uniform metric. By J. SZABADOS and A. K. VARMA 975
Convex functions with restricted curvature. By D. STYER and D. J. WRIGHT 981
Unique continuation theorems for some parabolic operators. By J. D. MCMICHAEL and D. M. OBERLIN 991
A local bifurcation theorem for c^1-Fredholm maps. By P. M. FITZPATRICK and JACOBO PEJSACHOWICZ 995
The general form of Green's theorem. By W. B. JURKAT and D.J.F. NONNENMACHER .. 1003
Teichmüller-type annihilators of L^1-analytic functions. By EDGAR REICH and HAROLD S. SHAPIRO 1011
Open relation theorem without closedness assumption. By SZYMON DOLECKI 1019
Persistence definitions and their connections. By H. I. FREEDMAN and P. MOSON 1025
Periodic solutions of some Liénard equations with singularities. By PATRICK HABETS and LUIS SANCHEZ 1035
A proof of the Pólya–Wiman conjecture. By YOUNG-ONE KIM 1045
On the type of Wiener–Hopf C^*-algebras. By ALBERT JEU-LIANG SHEU 1053
Small deformations of a class of compact non-Kähler manifolds. By L. ALESSANDRINI and G. BASSANELLI 1059
Some abelian Banach algebras of operators on the matricial II_1 factor. By A. GUYAN ROBERTSON 1063
Extensions of $*$-representations. By ANDREAS KASPAREK 1069

C. APPLIED MATHEMATICS

The masses in a symmetric centered solution of the n-body problem. By FLORIN NICOLAE DIACU 1079

D. GEOMETRY

Projective structures on reductive homogeneous spaces. By FABIO PODESTÀ 1087
The Banach–Tarski theorem on polygons, and the cancellation law. By R. J. GARDNER and M. LACZKOVICH 1097
Stability results for first order projection bodies. By P. R. GOODEY and H. GROEMER .. 1103
Twistor spaces with Hermitian Ricci tensor. By JOHANN DAVIDOV and OLEG MUŠKAROV 1115

G. TOPOLOGY

Functional characterizations of Baire spaces. By LUBICA HOLÁ 1121
Universal maps and surjective characterizations of completely metrizable LC^n-spaces. By A. CHIGOGIDZE and V. VALOV 1125
Homogeneity and cantor manifolds. By PAWEŁ KRUPSKI 1135
Corrigendum to "The derivative of Bazilevic functions". By R. R. LONDON and D. K. THOMAS 1143